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10/550,512	09/23/2005	Hiromasa Sakai	040302-0503	1973

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EXAMINER	
BARROW, AMANDA J	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/550,512	Applicant(s) SAKAI, HIROMASA	
	Examiner AMANDA BARROW	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 January 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 6-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 6-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application

1. The Applicant's amendment filed on 1/28/2010 was received. Claims 1, 10 and 11 were amended.

2. The texts of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on 12/23/08.

Claim Rejections - 35 USC § 103

3. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Noetzel et al. (US Publication No. 2003/0235730) and further in view of Fujita et al. (US Patent Application 2002/0192519 A1) and Keskula et al. (US Patent Application 2002/0051899 A1) on claims 1, 10 and 11 are maintained.

Regarding claim 1, Noetzel teaches a control device (power conditioner 14) of a vehicular fuel cell system illustrated in Figures 1 and 2 compromising: a warm-up output control section operative (power switching device 42) that allows a fuel cell system stack (18) of a fuel cell system (10) to be warmed up under a low temperature condition causing the fuel cell stack to generate electric power to allow predetermined warm-up electric power to be taken out ("In a current blocking mode [such as start-up], ...the power switching device 42 disallows substantially all current flow from the fuel cell unit 12, thereby enabling fuel cell unit 12 to operate in a substantially unloaded condition" (paragraph 22)); and a run permission section operative (power switching device 42) that discriminates whether the fuel cell stack assumes a

predetermined warm-up condition on the basis of either a voltage value or an electric current value of the fuel cell stack and providing run permission to a vehicle if it assumes the predetermined warm-up condition ("A power conditioner electrically connected to the fuel cell unit includes a power switching device. The power switching device selectively connects and disconnects the fuel cell voltage to at least one load dependent at least in part upon an operating temperature of the fuel cell stack, the fuel cell voltage, and the fuel cell current to thereby produce an output voltage" (paragraph 10)).

It would have been obvious to one of ordinary skill in the art to take the power conditioner of Noetzel and break it down into two entities (namely, the warm-up output control section operative and a run permission section operative), as the two entities can perform the same functions together or separately. The Courts have held that making known elements separable is within the skill of a person of ordinary skill in the art. See *In re Dulberg*, 129 USPQ 348 (CCPA 1961) (see MPEP § 2144.04).

Furthermore regarding claim 1, Noetzel teaches a control device (power conditioner 14) where the run permission section (power switching device 42) provides the vehicle with run permission when the voltage value of the fuel cell stack is equal to or more than a predetermined value: "The power switching device selectively connects and disconnects the fuel cell voltage to at least one load dependent at least in part.... by the fuel cell voltage" (paragraph 10). In the alternative, Noetzel teaches a control device (power conditioner 14) where the run permission section (power switching device 42) provides the vehicle with run permission when the electric current value of the fuel cell stack is equal to or more than a predetermined value: "The power

switching device selectively connects and disconnects the fuel cell voltage to at least one load dependent at least in part.... by the fuel cell current" (paragraph 10).

Furthermore, Noetzel teaches a control device (power conditioner 14) that determines the predetermined value in dependence upon an electric current value or a voltage value appearing when the fuel cell stack generates electric power:

"The mode controller… (which is part of the power conditioner 14) determines the mode in which power conditioner 14 and fuel cell unit 12 operate in order to maintain efficient operation… Mode controller 28 issues converter mode signal 54 which is indicative of the operational mode that is most efficient given the operating conditions and parameters of fuel cell unit 12 and power conditioner 14. Mode controller 28 issues to fuel cell controller 16 a cell operational control signal 70, which is indicative of any adjustments necessary to the output, such as, for example I_{STACK} and V_{STACK}" (where I_{STACK} is the current of the fuel cell stack and V_{STACK} is the voltage of the fuel cell stack) (paragraph 26).

Claim 1 has been further amended to recite that either the run available voltage value is based upon the electric value of the fuel cell stack or the run available current value is based upon the voltage value of the fuel cell stack. The specification provides an explanation as to what this claim language means:

> "…the run permission section retrieves run available voltage, in terms of detected stack current, referring to the current/voltage characteristics in Figure 6 [which is] representative of the relationship between stack current and stack voltage... at which the vehicle is available to travel. The current/voltage characteristics shown in Figure 6 [are] stored as a map in a memory..."

Noetzel does not teach how the predetermined voltage or current value is found and only states that these predetermined voltage and current values are used to determine whether or not a vehicle is provided with a run permission. Fujita discloses that voltage-current characteristic maps are known in the art and that an output voltage can be determined from the run available electric current and vise versa (paragraphs 173 and 174). Figure 11 of Fujita illustrates the voltage-current characteristic maps which show the relationship between the current and voltage

of the fuel cell as does Figure 12. Additionally, Keskula discloses that a fuel cell stack can be characterized by a voltage at a given current or conversely, as a current at a given voltage. These are called polarization curves and a family of these can be made for a given set of operating conditions as the relationship between voltage and current can vary according to the operating conditions (paragraphs 27-29).

Therefore, it would have been obvious to a person of ordinary skill in the art to apply the known technique of applying a voltage-current characteristic map to a fuel cell in order to obtain a predetermined voltage from the current value of the cell or vise versa as taught by Fujita or Keskula to the control device of Noetzel in order to determine the predetermined voltage value or predetermined current value. Applying a known technique to a known device ready for improvement to yield predictable results is likely to be obvious. See *KSR International Co. v. Teleflex Inc.*, 550 U.S., 82 USPQ2d 1385, 1395 – 97 (2007) (see MPEP § 2143, D.). The predictable results in this case would be the determination of the predetermined voltage or current value based on a set of operating conditions (i.e.- warm-up conditions).

Regarding claim 10, Noetzel teaches a control device (power conditioner 14) of a vehicular fuel cell system illustrated in Figures 1 and 2 compromising a warm-up output controlling means and a run permission provided means both embodied in a power switching device (42) as demonstrated in the arguments above for claim 1. As claim 10 does not provide any new means not already written in claim 1, see the above arguments.

The Applicant's specification supports the "means… for controlling the fuel cell stack" and the "means... for providing a vehicle with run permission" as recited in claim 10 (see Applicant's specification, page 5, lines 15-30). Accordingly, this means-plus-function language

invokes a 35 U.S.C. 112, sixth paragraph limitation (see MPEP 2181). The means "for controlling the fuel cell stack" and the means for "providing a vehicle with run permission" are interpreted to be a control device comprised of a warm-up output control section operative and a run permission section that make determinations on the temperature of the fuel cell on the basis of current and voltage values of the fuel cell.

Regarding claim 11, Noetzel teaches a method of controlling a fuel cell system compromising taking out predetermined warm-up electric power by controlling the fuel cell stack to generate electric power under a low temperature condition and in the case that the fuel cell system is warmed up, providing a vehicle with run permission based on the voltage and electric current values of the fuel cell stack:

"Once a fuel cell unit 12 reaches its operating or use temperature, fuel cell unit 12 exits the start-up mode and enters the operating mode. The readiness of fuel cell unit 12 to enter the operating mode is detected by mode controller 28, through monitoring of I_{STACK} and V_{STACK}, which alters mode signal 54 accordingly" (paragraph 32). Also, see claims 13-16 of Noetzel.

Claim 11 was further amended to add the claim limitations of claim 1. The rejection of these claim limitations can be found in the rejection of claim 1.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Noetzel in view of Fujita and Keskula as applied to claim 1 above, and further in view of Ito (Japanese Patent 2002-134150A).

Regarding claim 6, Noetzel teaches the run permission section (power switching device 42) providing the vehicle with run permission when the temperature of the fuel cell stack is equal to or more than a predetermined value (paragraph 10); however, Noetzel does not teach that the vehicle is provided with run permission based specifically on the temperature of the coolant in

the fuel cell stack. Ito provides a similar system to Noetzel and does teach the temperature of the coolant in the fuel cell stack providing information so that the vehicle is provided with run permission: "the above standby detection means detects standby of the above-mentioned fuel cell by the above-mentioned cooling method… based on the temperature of the above-mentioned cooling water [that flows through the fuel cell stack]" (paragraphs 1-9).

This is an example of combining prior art elements according to known methods to yield predictable results (MPEP 2143). It would have been obvious to one of ordinary skill in the art to have adapted the detection means determined by temperature of coolant taught by Ito to the control device of Noetzel to provide another means to determine whether the vehicle is provided with run permission.

6. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noetzel in view of Fujita and Keskula as applied to claim 1 above, and further in view of Matoba (U.S. Patent Application Publication 2004/0005487).

Regarding claim 7, Noetzel teaches the overall fuel cell system including a run permission section, but fails to teach that when the temperature of coolant in the fuel cell stack is less than a predetermined value, an auxiliary device is provided to a power plant including the fuel cell stack in order to heat the fuel cell stack. Matoba does teach this:

> "The combustor 9 produces combustion gas using the effluent supplied from the fuel cell 17. The produced combustion gas is supplied to a heat exchanger 10 and used as a heat source... to heat coolant used in the cooling system of the fuel cell 17" (paragraph 25).

Therefore, Matoba teaches an auxiliary device (combustor 9) to provide heat to a fuel cell stack 17.

Therefore, it would have been obvious to one of ordinary skill in the art to use the combustor of Matoba in the system of Noetzel in order to provide heat to the fuel cell stack so that it can get to optimal operating conditions more quickly. This is an example of combining prior art elements according to known methods to yield predictable results (see MPEP 2143).

Regarding claim 8, Matoba teaches that the auxiliary device (combustor 9) includes a combustor to which exhaust emitted from the fuel cell stack is introduced.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Noetzel in view of Fujita, Keskula and Matoba as applied to claims 7 and 8 above, and further in view of Beutel et al. (U.S. Patent Application 2002/0134239 A1) (hereinafter "Beutel").

Regarding claim 9, Matoba teaches a combustor section (9) combusting the exhaust and a heat exchanger (10) allowing combustion heat of the exhaust to be transferred to the coolant as is illustrated in Figure 1 (paragraphs 25-29), but fails to teach the rest of the recited claim. Beutel discloses that it is well known in the art to provide a combustor with an electric-heated catalyst section operative that is heated to a catalytic active temperature by electric heat and that the catalytic combustor section combusts the exhaust (paragraph 6).

This is an example of combining prior art elements according to known methods to yield predictable results (see MPEP 2143). It would have been obvious to one of ordinary skill in the art to combine the combustor with an electric-heated catalyst section operative of Beutel to the combustor of Matoba in order to make sure the effluent contains no hydrocarbons and is completely combusted.

Response to Arguments

8. Applicant's arguments filed 1/28/2010 have been fully considered but they are not persuasive.

Applicant's remaining principal arguments are

(a) Noetzel does not disclose or suggest a control device in which a run permission section is configured to provide run permission based on a run available current/voltage obtained from a predetermined current/voltage characteristics map showing a relationship between the current and the run available current/voltage.

(b) Fujita and Keskula do not remedy the deficiencies of Noetzle because they do not demonstrate that it is known in the art to provide a vehicle with run permission based on a run available current/voltage obtained from a predetermined current/voltage characteristics map showing a relationship between the current and the run available current/voltage.

In response to Applicant's arguments, please consider the following comments.

(a) This is remedied by Fujita and Keskula. Fujita discloses that voltage-current characteristic maps are known in the art and that an output voltage can be determined from the run available electric current and vise versa in a fuel cell (paragraphs 173 and 174). Figure 11 of Fujita illustrates the voltage-current characteristic maps which show the relationship between the current and voltage of the fuel cell as does Figure 12.

Additionally, Keskula discloses that a fuel cell stack can be characterized by a voltage at a given current or conversely, as a current at a given voltage. These are called polarization curves and a family of these can be made for a given set of operating conditions as the

relationship between voltage and current can vary according to the operating conditions (paragraphs 27-29).

(b) The combination of Noetzel with Fujita and Keskula render the claim obvious. Noetzel teaches a control device (power conditioner 14) where the run permission section (power switching device 42) provides the vehicle with run permission when the voltage value of the fuel cell stack is equal to or more than a predetermined value: "The power switching device selectively connects and disconnects the fuel cell voltage to at least one load dependent at least in part.... by the fuel cell voltage" (paragraph 10). Alternatively, the vehicle is provided with a run permission when the electric current value of the fuel cell stack is equal to or more than a predetermined value (paragraph 10). The control device (power conditioner 14) determines the predetermined value in dependence upon an electric current value or a voltage value appearing when the fuel cell stack generates electric power (paragraph 26).

Noetzel does not teach how the predetermined voltage or current value is found and only states that these predetermined voltage and current values are used to determine whether or not a vehicle is provided with a run permission. Fujita and Keskula remedy this deficiency as Fujita discloses that voltage-current characteristic maps are known in the art and that an output voltage can be determined from the run available electric current and vise versa (paragraphs 173 and 174). Figure 11 of Fujita illustrates the voltage-current characteristic maps which show the relationship between the current and voltage of the fuel cell as does Figure 12. Additionally, Keskula discloses that a fuel cell stack can be characterized by a voltage at a given current or conversely, as a current at a given voltage. These are called polarization curves and a family of

these can be made for a given set of operating conditions as the relationship between voltage and current can vary according to the operating conditions (paragraphs 27-29).

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMANDA BARROW whose telephone number is (571)270-7867. The examiner can normally be reached on 7:30am-5pm EST. Monday-Friday, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AMANDA BARROW/
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795